

pumped into a wooden tank 10 feet above the hatchery, holding 1200 gallons. Thus a constant circulation of the water in the tanks is maintained. The water is pumped from the sea at high water, and left to settle some days in a storage reservoir before use; each hatching tank has room for twelve wooden trays, measuring 16 inches by 10 inches, by 9 inches in depth, with a canvas strainer at the bottom to prevent the eggs escaping. The Society aims at recording observations respecting marine life, and the improvement of the fisheries of the United Kingdom, by the artificial propagation of marine fishes and Crustacea, by the pursuit of scientific observations and investigations respecting the natural history, habitat, migration, spawning food, and the effect of weather, temperature, and conditions of the water, currents, tides, light, and darkness upon the fauna of the sea; by the protection of young fish, and the introduction of practical appliances for the capture of mature fish; by endeavouring to ascertain the best methods of transporting fish in a fresh condition, and economically preserving them. By admitting fishermen into the Society, at a nominal subscription, they hope to get numerous observers and collectors from amongst those who spend their life reaping the harvest of the sea.

At the last meeting of the Société Chimique de Paris a paper by M. Meslans was presented by M. Moissan, announcing the isolation of fluoroform, CHF_3 , the fluorine analogue of chloroform, CHCl_3 . A brief abstract of this preliminary communication will be found in the *Chemiker Zeitung* for March 26. During the course of the work recently published concerning propyl and isopropyl fluorides, M. Meslans had occasion to study the action of silver fluoride upon iodoform. The result of this action was found to vary according to the conditions of experiment, liquid products being obtained under certain conditions, and gaseous products under others. The end result, however, was always the production of a gas, which turns out to be fluoroform. Chloroform, as is well known, is readily attacked by a warm alcoholic solution of potash, potassium chloride and potassium formate being produced: $\text{CHCl}_3 + 4\text{KOH} = \text{H.COOK} + 3\text{KCl} + 2\text{H}_2\text{O}$. It is interesting to learn that fluoroform behaves in precisely the same manner, for the gas is decomposed by either aqueous or alcoholic potash with formation of fluoride and formate of potassium. On being heated to redness in a glass tube fluoroform is also decomposed, with production of gaseous silicon tetrafluoride and a deposit of carbon. The gas is only very slightly absorbed by water, but it dissolves readily in chloroform or alcohol. Fluoroform has also been prepared by substituting chloroform or bromoform for the iodoform used in the first experiments.

At the same meeting M. Chabré reported that he also had obtained a gas by heating silver fluoride with chloroform in a sealed tube, which yielded potassium formate with potash, and was evidently identical with the fluoroform described by M. Meslans. The density of the gas was determined, and found to be 2.414. Fluoroform possesses the density 2.43, so there can be no doubt as to the identity of the gas. Although so readily attacked by warm potash, it was found that a cold alcoholic solution of potash was almost incapable of acting upon it.

M. MOISSAN also presented another interesting paper in the names of MM. Guenez and Meslans, describing the isolation of fluoral, CF_3CHO , the analogue of chloral, CCl_3CHO , the tri-chlor derivative of common aldehyde, CH_3CHO , and the hydrate of which has recently become so famous as a drug. Fluoral, like fluoroform, is a gas, and has been obtained by heating silver fluoride with anhydrous chloral. The gas dissolves to only a very slight extent in water, but is absorbed by aqueous or alcoholic potash with formation of formate and fluoride of potassium, thus again resembling its chlorine analogue. To complete the proof of its identity, the density of the gas was

determined and found to agree very closely with the calculated density of anhydrous fluoral.

THE additions to the Zoological Society's Gardens during the past week include two Ring-necked Pheasants (*Phasianus torquatus* ♂ ♀), British, presented by H. R. H. the Prince of Wales, K.G.; a Chacma Baboon (*Cynocephalus porciarius* ♀) from South Africa, two Indian Pythons (*Python molurus*) from India, five Common Boas (*Boa constrictor*) from South America deposited; three Red-footed Ground Squirrels (*Xerus erythropus*) from West Africa, two Himalayan Monauls (*Lophophorus impeyanus* ♀ ♀) from the Himalayas, two Diuca Finches (*Diuca grisea*), a Black-chinned Siskin (*Chrysomitris barbata*), two Field Saffron Finches (*Sycalis arvensis*), an Alaudine Finch (*Phrygilus alaudinus*) from Chili, purchased; a Hog Deer (*Cervus porcinus* ♂), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

OBJECTS FOR THE SPECTROSCOPE.

Sidereal Time at Greenwich at 10 p.m. on April 3 = 10h. 48m. 43s.

Name.	Mag.	Colour.	R A. 1890.	Decl. 1890.
			h. m. s.	° ' "
(1) G.C. 2343	—	Greenish.	11 8 10	+55 36
(2) 44 Leonis	6	Yellowish-red	10 19 27	+9 20
(3) 58 Leonis	4.5	Whitish-yellow.	10 54 54	+4 13
(4) 8 Leonis... ..	3	White.	11 8 30	+16 2
(5) 145 Schj.	8	Red.	12 19 36	+1 23
(6) S Coronæ	Var.	Reddish-yellow.	15 16 55	+31 46

Remarks.

(1) This is the well-known nebula 97 M, near β Ursæ Majoris. In the General Catalogue it is described as "a planetary nebula, very bright, very large, round; at first very gradually, then very suddenly brighter in the middle to a planetary disk; 19'0s. in diameter." Lord Rosse's drawing of the nebula indicates a very complex structure. I examined the nebula recently with Prof. Lockyer's 30-inch reflector at Westgate-on-Sea, but was unable to see all the details shown in Lord Rosse's drawing. The nebula appeared to be a large disk, ill-defined at the edges, and equally illuminated, with the exception of two darker disks situated diametrically opposite to each other, each being about half a radius in diameter. Dr. Huggins observed the spectrum in 1866, and found it to consist of bright lines. The two lines near $\lambda\lambda$ 500 and 495, and possibly a little continuous spectrum were recorded. On the occasion above referred to I saw the three usual nebula lines and the hydrogen line at G, but was unable to continue the observations on account of clouds. In further observations, additional lines ought to be looked for, and the character of the chief line near λ 500 particularly noted, as in the case of the nebula G.C. 2102, given last week.

(2) A star of Group II. Dunér states that the bands 2-8 are well seen, but that they are not strongly marked. It is important to secure further observations of stars like this, as there may very well be other differences besides the weakening of the bands as compared with those in which the banded spectrum is more fully developed.

(3) This has a fine spectrum of the solar type (Vogel). The usual differential observations are required.

(4) The spectrum of this star is a typical one of Group IV. (Vogel). The hydrogen lines are probably therefore very thick, and the metallic lines very thin, if visible at all. The thicker the hydrogen line the hotter the star, and the higher therefore its place on the "temperature curve."

(5) Vogel and Dunér agree in describing the spectrum of this star as a very fine one of Group VI. The three carbon bands are stated to be visible, but the intensity of the band near λ 564 relatively to the others is not given. This point should therefore receive attention. The secondary bands 4 and 5, and possibly 2 and 3 are visible. It is interesting to note that this star shows considerably more detail than several brighter ones of the same group.

(6) This variable will reach a maximum about April 9. Its period is about 360 days, and the magnitudes at maximum and minimum are 6.1-7.8 and 11.9-12.5 respectively (Gore). The spectrum is a very fine one of Group II., and the great range of variation makes it extremely probable that bright lines will appear at maximum or soon after, as already observed by Mr. Espin in variables with similar spectra. Variations in the intensities of the bright carbon flutings should also be noted.

A. FOWLER.

THE GREAT COMET OF 1882.—The *Bulletin Astronomique* for February 1890 reproduces with some additions a paper presented by M. F. Tisserand to the Academy of Sciences on February 3. It will be remembered that the segmentation of the nucleus of this comet was observed on September 30, 1882—that is, thirteen days after perihelion passage, and that Mr. Common in January 1883 saw five nuclei in a line. From an elaborate investigation into the conditions necessary for the development of these secondary nuclei, M. Tisserand concludes that the cause existed in the comet itself, and was not the result of external influence. The minimum relative variation required for the disgregation of the nucleus is $\frac{1}{350000}$ of the perihelion velocity. And it is suggested that this variation may be produced by interior actions, collisions, mutual attractions, or explosions, because of an excessive increase of temperature or the rotation of the head.

MELBOURNE STAR CATALOGUE.—In 1874 the First Melbourne General Catalogue of 1227 stars for the epoch 1870 was issued. The Second General Catalogue has just been received, and contains 1211 stars for the epoch 1880, deduced from observations made at the Melbourne Observatory under the direction of Mr. Ellery from 1871.0 to 1884.7. The separate results and the details of the observations from which this Catalogue has been compiled are contained in vols. v., vi., and vii., of the *Melbourne Observations*, and in the present Catalogue explanations are given of the processes used in forming the stars' places and the corrections applied. The whole of the observations were reduced and prepared for publication by Mr. E. J. White, the First Assistant Astronomer.

COMET α 1890.—The first comet of this year was discovered just before sunrise on March 19 by Mr. Brooks, of Geneva, U.S. Its exact place was found to be—

Cambridge Mean Time.	R.A.	Decl.
h. m. s.	h. m. s.	° ' " N.
21 March ... 16 57 ...	21 9 34.07 ...	6 25 30 N.

The daily movement in right ascension is + 16s., and in declination + 25'.

DISCOVERY OF ASTEROIDS.—On March 20, Dr. Palisa, at Vienna, discovered another minor planet, and the telegram announcing his discovery was received at the *Astronomische Nachrichten* office at midday on March 21. This comet is of interest, for, from its rapid movement, viz. - 25' in R.A. and + 10' in N.P.D., it appears to be near to the earth.

M. Charlois, of Nice Observatory, discovered a minor planet on March 10, and re-observed it on March 20. This brings the number of asteroids up to 290.

The asteroid (283) discovered by Prof. Luther on February 24 has received the name of Glauke.

SOLAR ACTIVITY IN 1889.—The record of the past year as to solar phenomena presents several noteworthy features. (1) The number of days on which the sun appeared to be free from either spots or faculæ; the days without spots being 211 as compared with 158 in 1888; and the days when neither spots nor faculæ were seen being more than twice as numerous last year as in the year previous. (2) The distinct but temporary revival of spot activity during the months of June, July, August, and September. (3) The appearance of spots in high latitudes; and lastly, the remarkable falling off in chromospheric phenomena, particularly during the last months of the year. It is, therefore, still difficult to be certain whether we have yet reached the actual minimum or no; the revival of the spots during last summer, connected as it was with so remarkable an increase in their mean distance from the equator, seemed to point to the minimum having been passed; but the season of almost perfect quiet which followed it, together with the decrease in the number and size of the prominences, favour the opposite conclusion. The mean daily spotted area for 1889 was less than that for 1888, but only by about one-seventh.

The three most remarkable groups of 1889 were those first seen on June 16, June 29, and August 2 respectively. The first-named was the largest group of the year; it formed and disappeared on the further side of the sun, and was seen during three rotations. The third was also seen during three rotations, but formed and died out in the visible hemisphere. It was the second group as to dimensions, and lay in S. lat. 20°, whilst the spot of June 16 was in S. lat. 6°. The spot of June 29 was only a very small one, and lasted but a couple of days, but was noticeable from its high latitude, 40° S. A fourth group, that first seen on August 9, though not attaining so large a mean area as the spot of June 16, exceeded it on one particular day, August 15.

The following table gives the monthly numbers for spots and faculæ as supplied by Prof. Tacchini in the *Comptes rendus*, vol. cviii. No. 21, vol. cix. No. 4, and vol. cx. No. 5, and may be compared with those given in NATURE for 1889 March 7, and in previous volumes:—

1889.	Proportion of days without spots.	Sun-spots.		Faculæ.	
		Relative frequency.	Relative size.	Mean daily number of groups.	Relative size.
January ...	1.00	0.00	0.00	0.00	6.00
February ...	0.50	3.26	8.12	0.56	1.56
March ...	0.62	1.69	3.64	0.50	6.81
April ...	0.60	0.65	4.35	0.40	7.25
May ...	0.96	0.04	0.65	0.04	5.30
June ...	0.56	1.97	25.22	0.45	9.63
July ...	0.39	2.95	16.97	0.87	14.35
August ...	0.19	6.77	20.03	1.26	17.77
September ...	0.48	1.18	8.22	0.61	28.48
October ...	0.73	0.64	1.55	0.27	18.18
November ...	1.00	0.00	0.00	0.00	0.62
December ...	0.61	1.68	4.09	0.65	29.55

The table shows that as in 1888 the faculæ did not vary quite in accordance with the spots, September and December being heavy months for the former, their relative area then exceeding that for any month since July 1886. The prominences on the other hand showed a very marked falling off towards the end of the year; February and March, light months for spots and faculæ, being much the most prolific as to the flames. The following are the mean numbers for the prominences resulting from Prof. Tacchini's monthly reports. It must be borne in mind that the difference in the atmospheric conditions of England and Italy renders it impossible to compare Prof. Tacchini's results with those formerly given by the late Rev. S. J. Perry, and which have been incorporated in former annual summaries in NATURE.

	Days of observation.	Mean daily number.	Prominences.	
			Mean height.	Mean extent.
1887 ...	214	8.26	45.2	1.7
1888 ...	227	7.94	45.9	1.5
1889 ...	247	3.20	34.7	1.1

The variations in the magnetic elements accorded in their more general features, though not in details, with those of the sunspots, as the following table given by Dr. R. Wolf in the *Comptes rendus*, vol. cx. No. 3, sufficiently shows:—

1889.	Wolf's relative numbers (Zurich).	Variation in magnetic declination (Milan).	
		$\Delta\tau$	$\Delta\delta$
January ...	1.0	-12.0	1.75
February ...	7.9	+0.9	3.99
March ...	6.3	+0.0	6.17
April ...	4.9	+1.0	8.85
May ...	2.4	-8.4	8.19
June ...	7.0	+0.5	8.86
July ...	8.0	+6.1	8.25
August ...	20.6	+18.7	8.99
September ...	6.3	-1.5	6.84
October ...	0.0	-2.0	6.10
November ...	0.0	-12.9	2.55
December ...	5.7	-4.2	1.96
Mean ...	5.8	-0.9	6.04

Dr. Wolf's formula for Milan, $v = 5.62 + 0.045 \tau$, with $\tau = 5.8$, would give $v = 5.88$, a much closer accord than for the two preceding years.